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Zohaib Aziz and Ahsanuddin Muhammad and Ghulam Hussain

Federal Urdu University of Arts, Science and Technology, Karachi Campus, Karachi, Pakistan, University of Karachi, University of Karachi

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GLOBAL ENVIRONMENT AND FACTORS AFFECTING THE SALARY OF THE CEO (CHIEF EXECUTIVE OFFICER) OF A GOODS PRODUCING FIRM:

AN ECONOMETRIC MODELING APPROACH USING STATA

ZOHAIB AZIZ[§], MUHAMMAD AHSANUDDIN[Ж] AND GHULAM HUSSAIN[ξ]

[§]LECTURER, DEPARTMENT OF STATISTICS, FEDERAL URDU UNIVERSITY OF ARTS, SCIENCE AND TECHNOLOGY, KARACHI, PAKISTAN
E-mail: zeea85@gmail.com

[Ж]ASSISTANT PROFESSOR, DEPARTMENT OF ECONOMICS, UNIVERSITY OF KARACHI, KARACHI, PAKISTAN.
E-mail: ahsankupk@yahoo.com

[ξ]PROFESSOR, DEPARTMENT OF STATISTICS, UNIVERSITY OF KARACHI, KARACHI, PAKISTAN.
E-mail: ghussain@uok.edu.pk

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ZOHAIB AZIZ[§], MUHAMMAD AHSANUDDIN[Ж] AND GHULAM HUSSAIN[ξ]

[§]LECTURER, DEPARTMENT OF STATISTICS, FEDERAL URDU UNIVERSITY OF ARTS, SCIENCE AND TECHNOLOGY, KARACHI, PAKISTAN
E-mail: zeea85@gmail.com

[Ж]ASSISTANT PROFESSOR, DEPARTMENT OF ECONOMICS, UNIVERSITY OF KARACHI, KARACHI, PAKISTAN.
E-mail: ahsankupk@yahoo.com

[ξ]PROFESSOR, DEPARTMENT OF STATISTICS, UNIVERSITY OF KARACHI, KARACHI, PAKISTAN.
E-mail: ghussain@uok.edu.pk

Abstract

The flattening of the world thanks to the cluster of profound socio-economic and politico-cultural changes has created unprecedented challenges for organizational leadership and management. The fast evolving global world of ours where challenges have to be continually met requires timely decision taken by CEOs' (Chief Executive Officers) who shape and give direction to world politics and economic order. In the light of this we have studied the decisions taken by CEOs' of goods producing firms' and their decisions on firm's productivity and profitability which in turn depend to a great deal on CEOs' salary structure. Better salary leads to influx of people from all over the world often leading to brain drain situation in developing countries. Globalization has created social disparities in the present economic system that are molded by the increasing polarization of work between people working in high paid knowledge sectors and others working in low paid sectors. Prior research has suggested that in a global environment capitalists benefit from other capitalists who pay higher salaries from the expansion of income.

The salary data of 177 CEOs' (Chief Executive Officers) for the year 1990 – published in the Business Week of June 6, 1991 has been analyzed to determine and correlate the effects of sales, market value (mktval), profit and CEOs' tenure (ceoten) on the CEOs' salary.

The performance of goods producing firms where the CEOs' served has been found to be strongly correlated with their salary intakes. The basic purpose of this research and study is to analyze the deciding factor in the salaries of top executives.

The CEOs' are the policy makers in all government and non-governmental organizations and their decision-taking greatly influences the performances of their institution. CEOs' performance with respect to their salaries and other variables mentioned above is found to be the deciding factor as regards policy execution matters in goods producing firm's performances.

Keywords: Econometric model, multicollinearity, STATA[10], elasticity, employment tenure and market value.

JEL Classification: C1; C2; C8; D1; J2; L1

1. INTRODUCTION

Our research is based on the data [1] consisting of 177 CEOs'. The data was used to examine the effects of *CEOs' salary* upon goods producing firm's performance. Initially different variables were taken which explained the impact of annual *salary* of CEOs, on the goods producing firm's *sales*, *market value*, *profit* and *CEOs tenure*. The data was recorded in 1990, so cross sectional data[1] [2] is available.

Regression model of *salary* was built with different explanatory variables in order to see if we incorporate certain explanatory variables, what the effect shall be. Do those variables explain well the regressand (dependent variables) or not and whether these are appropriate, and if not, how can they be made suitable? In some cases we took log of certain variables where we could not obtain linear relationship. This was done to find out the stochastic relationship existing between certain variables. There are several other issues related to the relationship between the variables which is left open for further research. The inference (the estimation and testing of hypothesis) is the other important aspect of our research which contributes to the other significant facet of our analysis.

2. THE MODEL

The relationship between *annual salary*[2], *firm's sales*[3] and *market value*[4] is assessed through computation using STATA[10] [3]. Scatter diagram was applied to study the causal relationship between different variables. If we look at Fig. 1 shows that the red points[5] are not appropriately lying around the straight line and more or less same state is of the blue points[6]. The variables were then plugged with log so that the scatter plot could be transformed into linear shape as shown in Fig. 2. As seen now in Fig. 2 the red points and blue points are lying almost about the straight line. Therefore, after experimenting it was concluded that the behavior of the log variables was linear in nature.

---

[1] Data are recorded in single point of time.
[2] 1990 compensation; assessed in thousands of dollars.
[3] 1990 firm sales; assessed in millions of dollars.
[4] Market value at the end of year 1990 assessed in millions of dollars.
[4] Market value at the end of year 1990 assessed in millions of dollars.
[5] Showing the points of market value with salary.
[6] Showing the points of sales with salary.

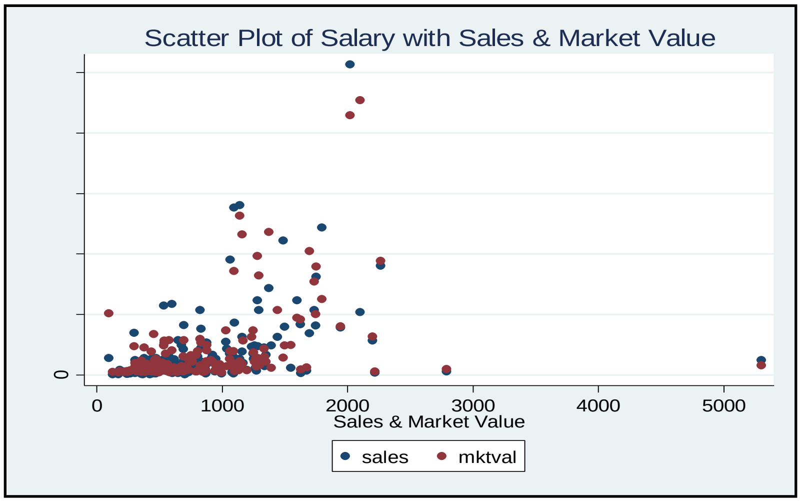

Fig. 1

$$Salary = \beta_1 (sales)^{\beta_2} (m\,ktval)^{\beta_3}\, e^{u} \quad (1)$$

Afterwards the above exponential regression model was converted into the log-log model as shown in equation 2.

$$log(Salary) = log\beta_1 + \beta_2\, log(sales) + \beta_3\, log(mktval) + u \quad (2)$$

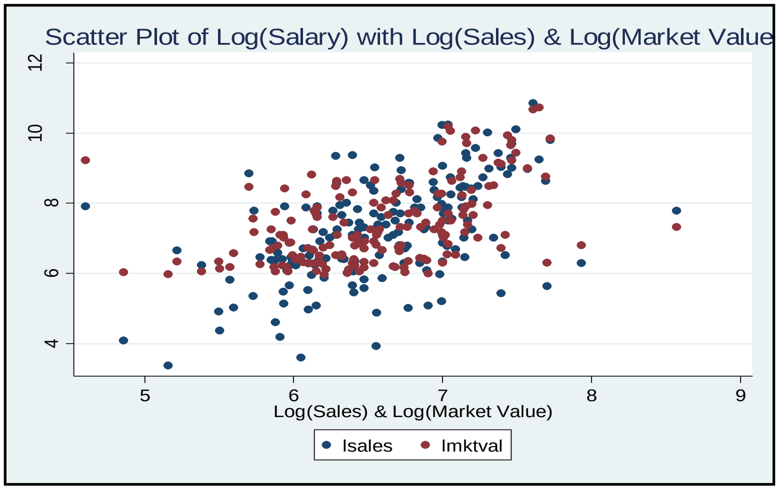

Fig. 2

The disturbance term u is assumed to follow normal distribution with mean 0 and variance σ^2, β_2 is the elasticity of salary with respect to sales and β_3 is the elasticity of salary with respect to market value. $\beta_1^* = \ln \beta_1$ in the model and is formulated as:

$$log(Salary) = \dot{\beta}_1 + \beta_2 \log(sales) + \beta_3 \log(mktval) + u \quad (3)$$

Output of the fitted above log-log model (constant elasticity model) is:

```
. regress lsalary lsales lmktval

      Source |       SS       df       MS              Number of obs =     177
-------------+------------------------------           F(  2,   174) =   37.13
       Model |  19.3365598     2  9.66827992           Prob > F      =  0.0000
    Residual |  45.3096617   174  .260400355           R-squared     =  0.2991
-------------+------------------------------           Adj R-squared =  0.2911
       Total |  64.6462215   176  .367308077           Root MSE      =  .51029

------------------------------------------------------------------------------
     lsalary |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lsales |   .1621283   .0396703     4.09   0.000     .0838314    .2404251
     lmktval |    .106708    .050124     2.13   0.035     .0077787    .2056372
       _cons |   4.620918   .2544083    18.16   0.000     4.118794    5.123041
------------------------------------------------------------------------------
```

Table 1

The intercept value 4.621 represents the estimate of $\beta_1^* \left(= \ln \beta_1\right)$ i.e. $\hat{\beta}_1^* = 4.62$, value of elasticity of salary with respect to *sales* is 0.162 and represents the estimate of β_2 i.e. $\hat{\beta}_2 = 0.162$, and the value of elasticity of salary with respects to *market value* is .107 representing the estimate of β_3 i.e. $\hat{\beta}_3 = 0.107$, as shown in Table 1. Therefore, the fitted regression model is as follows.

$$\widehat{log}(Salary) = 4.621 + 0.162\, log(Sales) + 0.107\, log(mktval) \tag{4}$$

In order to find the estimate of exponential regression model we computed the value of $\beta_1 \left(= e^{\beta_1^*}\right)$ and got $\beta_1 = 101.6$. Therefore,

$$\widehat{Salary} = 101.6\, (Sales)^{0.162} (mktval)^{0.107} \tag{5}$$

Consequently for interpretation of the model, the fitted model given in equation 4 is considered.

3. METHODOLOGY

Scatter diagram of *CEOs' salary* was constructed with respect to *sales* and *market value* as they were found to be the most salary-influencing variable factors. The scatter diagram showed that the points were not lying around a straight line, and, therefore, logged variables had to be used, with which it was seen that more or less all points were lying along a straight line, and this required log-log or constant elasticity model for regression.

In this paper statistical inference approach was adopted to test the parameter connotation, and the overall significance of the model was checked through ANOVA. For determining the coefficient of determination of the model, we plugged from time to time one variable after the other; like *profit* and *CEOs tenure*. As more and more of the above variables were incorporated it was seen that corresponding increases in the value of coefficient of determination took place. Correlation matrix technique was applied to locate multicollinearity amongst regressors. Combined matrix scatter plot was used to observe the presence of multicollinearity amid explanatory variables. To locate whether or not high or low degree of multicollinearity persisted in our model, VIF (variance inflation factor) and TOL (tolerance) mathematical testing methods were used. CI (condition index) procedure based on extreme Eigen-values was incorporated to check whether at this stage in the model serious collinearity problem existed or not. Hence, Ramsey's RESET (Regression Specification Error Test) was fruitfully used to examine whether or not certain variables within the model should be omitted and at the same time ensure that the selected variables are specified as per the given specification and appropriately incorporated. Graphical approach (histogram and Q-Q plot) was used in order to see normality of the disturbance term which was the requirement for latter test done in our research. Finally at the end Breusch-Pagan/Cook-Weisberg test was successfully carried out to find the presence of heteroscedasticity in the fitted values of the final model built. Our inference was found to be correct and logically true. Throughout the work OLS (ordinary least square) technique was used as a standard. The basic purpose was to locate which variable has a lasting effect on the *CEOs' salary*. Goods producing firm's *Sales* clearly had the greatest influence on *CEOs' salary* as compared to the rest of the explanatory variables taken.

3.1 INTERPRETATION OF THE FITTED MODEL

As far as the given model is concerned, the partial regression coefficients represents the elasticity, where $\hat{\beta}_2 = 0.162$ tell us that if there is one percent increases in goods producing firm's *sales*, *CEOs' salary* is increased by about 0.162 %, if *market value* taking as a constant. Similarly, $\hat{\beta}_3 = 0.107$ explains that if one percent increase in *market value* is estimated it increases *CEOs' salary* by about 0.107 % keeping goods producing firm's annual *sales* as a constant.

3.2 SIGNIFCANCE OF ELASTICITY

If we look into the significance of elasticity we will see whether the elasticity of *salary* with respect to *sales* i.e. β_2 is significant and if the elasticity of salary with respect to *sales* i.e. β_3 is significant too. The P-value approach is used to test the significance of elasticity. The P-value of corresponding partial regression coefficient has been taken from the Table 1. As seen in Table 2 partial regression coefficients are significant, since the explanatory variables after taking the log are explained by the regressand (*salary*) better than before the application of log. Regressors are found to be linearly related to the response variable.

Elasticity	Null Hypothesis	Alternate Hypothesis	P-value	Level of Significance of two-tailed test	Decision
β_2	$\beta_2 = 0$ or Insignificant	$\beta_2 \neq 0$ or Significant	0.00*	0.025	Significant
β_3	$\beta_3 = 0$ or Insignificant	$\beta_2 \neq 0$ or Significant	0.035**	0.025	Significant

Table 2

- Policy: if P-value > Level of Significance, accept null hypothesis, otherwise reject null hypothesis.
- * Represents the P-value of t-statistic which is used to test the elasticity of salary with respect to sales keeping market value as a constant.
- ** Represents the P-value of t-statistic which is used to test the elasticity of salary with respect to market value keeping sales as a constant.
- Level of significance is checked at 5%.

3.3 OVERALL SIGNIFICANCE OF THE MODEL

The overall significance of the model is tested through F-test or P-value approach. The P-value of F-statistic is taken from Table-1, after using the software STATA[10].

Null Hypothesis	Alternate Hypothesis	P-value	Level of Significance	Decision
$\beta_2 = \beta_3 = 0$ or Insignificant	Not all partial regression coefficients are simultaneously zero or Significant	0.00***	0.05	Significant

Table 3

- Policy: If P-value > Level of Significance, accept null hypothesis, otherwise reject null hypothesis.
- *** Represents the P-value of F-statistic which is used to test overall significance of the model.
- Level of significance is checked at 5%.

The P-value=$P(F \geq 37.13) \cong 0$ which is less than the level of significance leads to the rejection of the null hypothesis. Since not all partial regression coefficients are simultaneously zero, therefore taking *log(sales)* and *log(market value)* together have an effect on *log(salary)*. We, therefore, conclude that the model is overall significant.

3.4 PLUGGING OF FURTHER VARIABLES

As we know that *CEOs salary* not only depends on the goods producing firm's *sales* and *market values* as several other variables also do affect *CEOs salary*. So, other variables are incorporated into the model (2).

3.4.1 PLUGING THE 'PROFIT' VARIABLE INTO THE MODEL

Profit[7] is another variable that has impact on *CEOs' salary*. *Profit* was not incorporated in logarithmic form because the *profits* for nine of the companies/institution in the data are negative. Therefore the variable *Profit* was plugged into the model given in equation 3 without logarithmic form, and fitting again the above model yields:

$$log(Salary) = \dot{\beta}_1 + \beta_2\, log(sales) + \beta_3\, log(mktval) + \beta_4\, profits + u \qquad (6)$$

```
.
. regress lsalary lsales lmktval profits

      Source |       SS       df       MS              Number of obs =     177
-------------+------------------------------           F(  3,   173) =   24.64
       Model |   19.350978     3    6.450326           Prob > F      =  0.0000
    Residual |  45.2952436   173  .261822217           R-squared     =  0.2993
-------------+------------------------------           Adj R-squared =  0.2872
       Total |  64.6462215   176  .367308077           Root MSE      =  .51169

------------------------------------------------------------------------------
     lsalary |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lsales |   .1613682   .0399101     4.04   0.000     .0825949    .2401416
     lmktval |   .0975286   .0636886     1.53   0.128    -.0281782    .2232354
     profits |   .0000357    .000152     0.23   0.815    -.0002643    .0003356
       _cons |   4.686924   .3797294    12.34   0.000     3.937425    5.436423
```

Table 4

Fitted regression equation can now be written as:

$$\widehat{log}(Salary) = 4.69 + 0.161\, log(sales) + 0.098\, log(mktval) + 0.000036\, Profit \qquad (7)$$

[7] 1990 profit assessed in millions of dollars.

In the above model the coefficient on *profit* is very small. It is to be noted that *profit* is measured in millions, so if *profit* increase by $1 billion, implying change in *profit* is equal to 1,000. This is a huge change indeed, meaning that an increase in predicted *salary* is only about 3.6%. However, it should be noted that in the model we are holding *sales* and *market value* as fixed. Then the question arises that whether these institution performance variables explain most of the variation in *CEOs' salary* or not. The answer is that, taken together, these variables (and dropping *profit* does not change result much) do explain almost 30% (see R^2 in Table 4) of the variation in *log(salary)*. However, this does not explain "most" of the variation because certainly there must be other factors which do also affect *CEOs' salary*.

3.4.2 PLUGING OF THE "CEOs TENURE" INTO THE MODEL

Now incorporating the fourth variable i.e. *CEOs tenure*[8] into the model (3), we get:

$$log(Salary) = \dot{\beta}_1 + \beta_2\, log(sales) + \beta_3\, log(mktval) + \beta_4\, profits + \beta_4\, ceoten + u \qquad (8)$$

```
. regress lsalary lsales lmktval profits ceoten

      Source |       SS       df       MS              Number of obs =     177
-------------+------------------------------           F(  4,   172) =   20.08
       Model |  20.5768095     4  5.14420236           Prob > F      =  0.0000
    Residual |  44.0694121   172  .256217512           R-squared     =  0.3183
-------------+------------------------------           Adj R-squared =  0.3024
       Total |  64.6462215   176  .367308077           Root MSE      =  .50618

------------------------------------------------------------------------------
     lsalary |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
      lsales |   .1622339   .0394826     4.11   0.000     .0843012    .2401667
     lmktval |   .1017598    .063033     1.61   0.108     -.022658    .2261775
     profits |   .0000291   .0001504     0.19   0.847    -.0002677    .0003258
      ceoten |   .0116847    .005342     2.19   0.030     .0011403     .022229
       _cons |    4.55778   .3802549    11.99   0.000     3.807213    5.308347
```

Table 5

With the help of Table 5 now we can write the fitted regression model as:

$$\widehat{log}(Salary) = 4.56 + 0.162\, log(sales) + 0.102\, log(mktval) + 0.000029\, Profit + 0.017 ceoten \quad (9)$$

The partial regression coefficient of *CEOs' tenure* represents that if one more year *CEOs' tenure* increases one more year the predicted salary will increase by more or less 1.2%. The problem is that whether the *CEOs' tenure* variable affects the *CEOs' salary* variable. The answer can be

[8] Tenure of CEOs at firm's/organization.

provided through the computed value of R^2 (shown in Table 5) which explains that almost 32% variations has been explained by plugging all the four explanatory variables from the *CEOs' salary*. The point to be noted here is that before incorporating the *CEOs' tenure* variable the explained variation was 30%, but after plugging *CEOs' tenure* variable only about 2% variations was further explained in regressand.

This again proves that model is overall significant because the P-value of F-statistic is zero, less than the level of significance, as well as, all the partial regression coefficients are significant.

3.5 DETECTION OF MULTICOLLINEARITY

Multicollinearity is a linear relation between many independent variables [4]. multicollinearity has many affects on regression analysis; if multicollinearity exists then OLS (ordinary least square) estimates of the model would not be reliable and its variances may be high. Due to this, the model cannot provide meaningful results for which the model is being built and for the said reasons we are applying the following methods to detect the multicollinearity .

3.5.1 CORRELATION BETWEEN THE VARIABLES

However, some questions may be raised here: Are the independent variables correlated to each other and whether the multicollinearity assumption violates. For validating purposes we construct correlation matrix.

```
. correlate lsalary lsales lmktval profits ceoten
(obs=177)

             |  lsalary   lsales  lmktval  profits   ceoten
-------------+---------------------------------------------
     lsalary |   1.0000
      lsales |   0.5300   1.0000
     lmktval |   0.4815   0.7359   1.0000
     profits |   0.3967   0.6063   0.7769   1.0000
      ceoten |   0.1147  -0.0377  -0.0435  -0.0216   1.0000
```

Table 6

We are finding the sample correlation to detect the multicollinearity amongst the independent variables. The correlation between *log(sales)* and *log(marke tvalue)* is about 0.74(approx.), between *log(sales)* and *profit* is about 0.61(approx.), and between *log(marke tvalue)* and *profit* is about 0.78, which are fairly high. On the other side the correlation of *log(sales), log(market value)* and *profit* with *CEOs tenure* is too small (negligible) but negative. This means that *CEOs tenure* does not have much multicollinearity with other variables.

However, from the above we cannot be certain that multicollinearity is not a big problem amongst the above explanatory variables, so therefore we apply other techniques such as detection of multicollinearity through scatter plot.

3.5.2 DETECTION OF MULTICOLLINEARITY BY SCATTER PLOT

Scatter plot was applied to see how the variables in the given regression model are related. Fig. 3 represents the scatter plot for the *CEOs' salary*. This is a five-by-five box diagrams because we have five variables in the model, a dependent variable *log-salary* (lsalary) and four explanatory variables: *log-sales* (lsales), *log-market value* (lmktval), *profit*, *CEOs' tenure* (ceoten). There are no scatter points in the boxes from the main diagonal starting from the upper left-hand corner and going to the lower right-hand corner. The leading diagonal shows the correlation coefficient of itself which is always equal to 1. The off-diagonal shows inter-correlations among the given variables. The variables *log-sales* (lsales) and *log-market value* (lmktval) are correlated (the correlation coefficient between the two is 0.7359). The variables *log-sales* (lsales) and *profit* are correlated (the correlation coefficient between the two is 0.6063). The variables *log-sales* (lsales) and *CEOs' tenure* (ceoten) are very small and negatively correlated (the correlation coefficient between the two is -0.0377). The variables *log-market value* (lmktval) and *profit* are correlated (the correlation coefficient between the two is 0.7769). The variables *log-market value* (lmktval) and *CEOs' tenure* (ceoten) are very small and negatively correlated (the correlation coefficient between the two is -0.0435). The variables, *profit* and *CEOs' tenure* (ceoten), are very small and negatively correlated (the correlation coefficient between the two is -0.0216).

The same obtained above mathematical evaluation for correlation can be graphically verified from the matrix scatter plot as shown below.

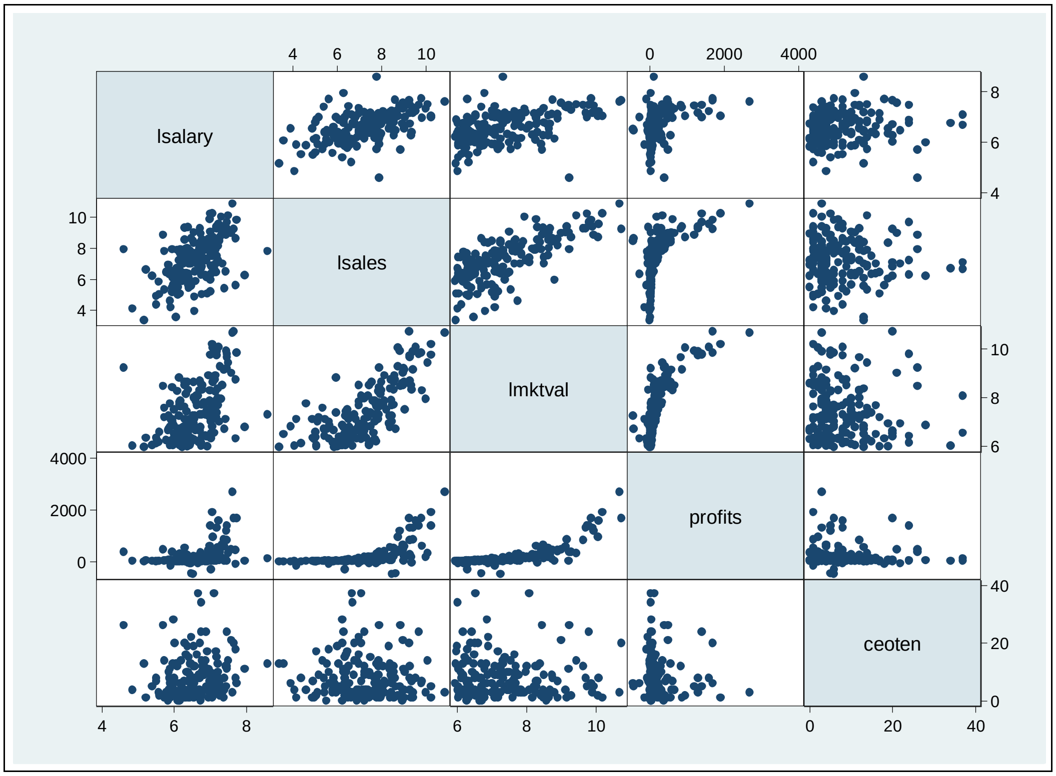

Fig. 3

Moderate linear relationship is observed through above multiple scatter plots if we look at row 3 and column 2. Row 4 and column 2 suggest low moderate linear correlation. Row 4 and column 3 also represent low moderate linear correlation. Row 5 and column 2 suggest almost no linear correlation and similarly row 5 and column 3 suggest almost no linear correlation and similar condition is of row 5 and column 4.

From the above analysis it cannot be surely said that multicollinearity does not exist and therefore the following mathematical testing methods were applied to arrive to a concrete conclusion.

3.5.3 VARIANCE INFLATION FACTOR AND TOLERANCE

The strength of multicollinearity as well as the speed with which variances and covariances increase is measured by the variance inflation factor (VIF)[5][6]. The formula applied for VIF is:

$$VIF_j = \frac{1}{1 - R_j^2} \quad ; \quad j = 1, 2, \dots, k$$

Where R_j^2 is the coefficient of determination the regression of the j^{th} independent variable on the remaining $(k-1)$ independent variables.

Tolerance [8] is nothing but the inverse of VIF. The tolerance is computed as:

$$TOL_j = \frac{1}{VIF_j} \quad ; \quad j = 1, 2, \dots, k$$

$$\text{Policy-I :}\begin{cases} \text{The vairable is highly collinear} & \text{if } VIF > 10 \\ \text{The variable is not highly collinear} & \text{if } VIF \leq 10 \end{cases}$$

and

$$\text{Policy-II:}\begin{cases} \text{The vairable has insignificantly greater degree of collinearity} & \text{if } TOL \to 0 \\ \text{The variable has signficantly less degree of collinearity} & \text{if } TOL \to 1 \end{cases}$$

Above Policy-I and Policy-II has been formulated from Gujarati, D. N. (2009), *Basic Econometrics* (5th edit.), p. 340.

```
. estat vif

    Variable |       VIF       1/VIF  
-------------+----------------------
     lmktval |      3.51    0.285222
     profits |      2.54    0.393660
      lsales |      2.20    0.455352
      ceoten |      1.00    0.997637
-------------+----------------------
    Mean VIF |      2.31
```

Table 7

Variable	VIF	TOL	POLICY-I	POLICY-II	Decision-I	Decision-II	Strength of multicollinearity according to rankings**** of variables
lmktval	3.51	0.285	<10	>0 and <1	Not highly collinear	Significantly less collinear	IV
profits	2.54	0.394	<10	>0 and <1	Not highly collinear	Significantly less collinear	III
lsales	2.20	0.455	<10	>0 and <1	Not highly collinear	Significantly less collinear	II
ceoten	1.00	0.997	<10	>0 and <1	Not highly collinear	Significantly less collinear	I

Table-8

- **** Represent that Rankings are in ascending order i.e. the variable having least strength of multicollinearity has been assigned rank 1 accordingly and so on.

It has been found that according to formulated Decision-I and Decision-II as per policies I & II respectively high multicollinearity does not exist among the variables.

According to Table-8 *CEOs tenure* (ceoten) has least multicollinearity and *log-market* value (lmktval) is the most multicollinear as compared to all other explanatory variables taken. The variables *profit* and *log-sales* in terms of multicollinearity hold second and third positions respectively. For further refinement of our result the following condition index procedure has been utilized.

3.5.4 DETECTION OF MULTICOLLINEARITY THROUGH CONDITION INDEX (CI) BASED ON EXTREME EIGEN VALUES

To diagnose the multicollinearity between the regressor, the technique of condition index (CI) is reliable which is based on Eigen values, the condition index would be found as:

$$CI = \sqrt{\frac{Maximum\ \ eigen\ \ value}{Minimum\ \ eigen\ \ value}} = \sqrt{k}\ ; \qquad \text{where } k \text{ is the condition number}$$

$$\text{Policy-III:}\begin{cases} There\ is\ weak\ multicolinearity & if\ CI < 10 \\ There\ is\ moderate\ to\ strong\ multicolinearity & if\ 10 \le CI \le 30 \\ There\ is\ severe\ multicolinearity & if\ CI > 30 \end{cases}$$

Policy-III has also been formulated from Gujarati, D. N. (2009), *Basic Econometrics* (5th Ed.), P.340.

```
. pca lsales lmktval profits ceoten

Principal components/correlation                 Number of obs    =       177
                                                 Number of comp.  =         4
                                                 Trace            =         4
    Rotation: (unrotated = principal)            Rho              =    1.0000

    --------------------------------------------------------------------------
       Component |   Eigenvalue   Difference         Proportion   Cumulative
    -------------+------------------------------------------------------------
           Comp1 |      2.41768      1.41985             0.6044       0.6044
           Comp2 |       .99783      .601898             0.2495       0.8539
           Comp3 |      .395932       .20737             0.0990       0.9529
           Comp4 |      .188562            .             0.0471       1.0000
    --------------------------------------------------------------------------

Principal components (eigenvectors)

    --------------------------------------------------------------------
        Variable |    Comp1     Comp2     Comp3     Comp4 | Unexplained
    -------------+----------------------------------------+-------------
          lsales |   0.5575    0.0145    0.7558    0.3432 |           0
         lmktval |   0.6027    0.0164   -0.0847   -0.7933 |           0
         profits |   0.5694    0.0422   -0.6491    0.5027 |           0
          ceoten |  -0.0420    0.9989    0.0178   -0.0132 |           0
    --------------------------------------------------------------------
```

Table 9

We have maximum and minimum Eigen values 2.41678 and 0.188562 from table 9 respectively so therefore,

$$k = \frac{2.41678}{0.188562} = 12.8169$$

$$\text{Then, } CI = \sqrt{k} = \sqrt{12.8169} = 3.58007$$

According to policy-III we observed that CI (condition index) is less than 10 so it suggests that there is weak multicollinearity or we can say in short that we do not have a serious colinearity problem. It means our model (9) has passed the multicollinearity issue in positive aspect. Using Q-Q plot and histogram it was found that residuals follow normal distribution.

3.7 RAMSEY'S REGRESSION SPECIFICATION ERROR TEST

Ramsey (1969) gave nevertheless another technique for testing a model's specification. The validation for the Ramsey RESET method is that the estimated residuals ($\hat{u}$) that stand for omitted-variable effects can be estimated by a linear combination of the powers of the fitted values [10].

```
. estat ovtest

Ramsey RESET test using powers of the fitted values of lsalary
       Ho:  model has no omitted variables
                 F(3, 169) =      1.08
                  Prob > F =      0.3588
```

Table 10

From the above output the following result has been generated.

Null Hypothesis	Alternate Hypothesis	P-value of F-statistic	Level of Significance	Decision
The model has no specification error	The model has specification error	0.3588*****	0.05	Significant

Table 11

- Policy: if P-value > Level of Significance, accept null hypothesis, otherwise reject null hypothesis.
- ***** Represents the P-value of F-statistic is used to test specification error of fitted model.
- Level of significance is checked as 5%.

The p-value=$P(F > 1.68) \cong 0.3588$ which is greater than the level of significance leads to the acceptance of the null hypothesis. The result shows that the model given in equation 9 has no specification error.

3.8 BREUSCH-PAGAN TEST FOR HETEROSCEDASTICITY

The Breusch-Pagan[9] test for hetrocedasticity of fitted values of regressand is similar to the white test, with an auxiliary regression of the squared OLS (ordinary least square) residuals on variables thought to determine the heteroscedasticity [11]. The BP version of the test the disturbance term is assumed to be normally distributed. For this we have checked the normality in previous work.

```
. estat hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of lsalary

         chi2(1)      =     0.22
         Prob > chi2  =   0.6355
```

Table 12

Tested against 5% level of significance.

From the Table 12 above we can see that the P-value of Chi-square statistic which is used to test the homogeneity of variances of fitted values of log-salary (regressand) here is 0.6355 which is greater than the level of significance according to the P-value approach. Therefore we safely conclude that there is no hetereoscedasticity into the fitted values of the model.

4. CONCLUSION

The purpose of this research was to determine the deciding factor behind *CEOs salary* structure. Of course the major variables in the model were supposed to have major influence on *CEOs salary*. Indeed some variables have more influence as compared to others.

It has been found that the changing patterns of sales are the most dominant factor amongst all other variables which directly bear on the salary structure of the CEOs'. Secondly, *market value* directly affects *CEOs salary* as modern market structure depends on demand and supply of the product in question. Third, it is the experience of the CEOs' that really matters and their expertise has an impact on the goods producing firm's performance. Profit, the fourth variable, does not much influence the salary structure as such.

[9] Breusch-Pagan test states an form of heteroscedasticity which arises when the disturbance variance are systematically related to a variable or variables

In all the combined effect of all the variables like *age*, *college education*, *profit margins*, *company's tenure* also influences *CEOs salary* structure but the effect is negligible .As the influence of these other variables not taken are minor as compared to major variables taken, therefore, we have not computed their values.

In our constructed final model (9) we can confidently say that our model is overall significant where the coefficients of the explanatory variables are significantly stable as well, and all the variables through statistical testing are observed not to be perfectly related to each other, i.e. they have no significant multicollinearity. Same result was also obtained through SAS software.

Heteroscedasticity is not found to be present in the fitted values of *salary* which shows that the estimates of the model do not have much variability and in short we can say that variances are homogeneous.

Likewise, we may also conclude that the intercept term of the model i.e., *salary*, must be paid to CEOs' in order to run an institution whether or not other variables coefficients do or do not influence the salary.

The above model satisfies as well the assumption of regression model.

At the heart of globalization lies the organization of production and distribution of goods and services on a world scale and it is a fact that the dynamics of these depends on CEOs' value judgment. In a global environment it is the CEO of any firm, multinational or president of government or non-governmental organization who guides the organizations to success. Thus fixation of CEOs' salary structure plays a pivotal role in a global competitive environment where movement of people for better job opportunities takes place at jet speed.

We can therefore conveniently use this model globally as a generalization to fix the *CEOs' salary*. It is definitely the deciding factor in any goods producing firm's sales and policy decisions.

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